FORM PTO-1390 REV. 5-93	US DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTORNEYS DOCKET NUMBER
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371		P00,1767
		U.S. APPLICATION NO. (if known, see 37 CFR 1.5) 09/700093
INTERNATIONAL APPLICATION NO. PCT/DE99/01309	INTERNATIONAL FILING DATE 03 MAY 1999	PRIORITY DATE CLAIMED 11 MAY 1998

TITLE OF INVENTION

METHOD AND COMMUNICATIONS SYSTEM FOR PROCESSING STATE INFORMATION IN A MANAGEMENT NETWORK HAVING A NUMBER OF MANAGEMENT LEVELS

APPLICANT(S) FOR DO/EO/US **LUCIAN HIRSCH ET AL.**

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay.
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of International Application as filed (35 U.S.C. 371(c)(2)) - drawings attached.
   a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ has been transmitted by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2) - drawings attached.
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. §371(c)(3))
   a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ have been transmitted by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☒ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern other document(s) or information included:

11. ☐ An Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98; **(PTO 1449, Prior Art, Search Report)**.
12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 C.F.R. 3.28 and 3.31 is included. **(SEE ATTACHED ENVELOPE)**
13. ☒ Amendment "A" Prior to Action.
    ☐ A SECOND or SUBSEQUENT preliminary amendment.
14. ☐ A substitute specification.
15. ☒ A change of address letter attached to the Declaration.
16. ☒ Other items or information:
    a. ☒ Request for Approval of Drawing Modifications, 3 sheets of drawings, Figures 1-4.
    b. ☒ Appointment of Associate Power of Attorney
    c. ☒ EXPRESS MAIL #EL655299475US dated November 10, 2000.

529 Rec'd PCT/PTC 10 NOV2000

U.S. APPLICATION NO. (if known, see 37 C.F.R. 1.5)	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
09/700093	PCT/DE99/01309	P00,1767

17. ☒ The following fees are submitted:	CALCULATIONS	PTO USE ONLY
BASIC NATIONAL FEE (37 C.F.R. 1.492(a)(1)-(5): Search Report has been prepared by the EPO or JPO $860.00		
International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) .. $690.00		
No international preliminary examination fee paid to USPTO (37 C.F.R. 1.482) but international search fee paid to USPTO (37 C.F.R. 1.445(a)(2) $710.00		
Neither international preliminary examination fee (37 C.F.R. 1.482) nor international search fee (37 C.F.R. 1.445(a)(2) paid to USPTO $1000.00		
International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) ..... $ 100.00		
ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 860.00	
Surcharge of $130.00 for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 C.F.R. 1.492(e)).	$	

Claims	Number Filed		Number Extra	Rate		
Total Claims	29	- 20 =	9	X $ 18.00	$ 162.00	
Independent Claims	02	- 3 =	0	X $ 80.00	$	
Multiple Dependent Claims				$270.00+	$	
TOTAL OF ABOVE CALCULATIONS =					$ 1022.00	
Reduction by ½ for filing by small entity, if applicable. Verified Small Entity statement must also be filed. (Note 37 C.F.R. 1.9, 1.27, 1.28)					$	
SUBTOTAL =					$ 1022.00	
Processing fee of $130.00 for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(f)). +					$	
TOTAL NATIONAL FEE =					$ 1022.00	
Fee for recording the enclosed assignment (37 C.F.R. 1.21(h). The assignment must be accompanied by an appropriate cover sheet (37 C.F.R. 3.28, 3.31). $40.00 per property +						
TOTAL FEES ENCLOSED =					$ 1022.00	
					Amount to be refunded	$
					charged	$

a. ☒ A check in the amount of $ 1022.00 to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of $ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. **501519**. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 C.F.R. 1.494 or 1.495 has not been met, a petition to revive (37 C.F.R. 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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BOX PCT
IN THE UNITED STATES DESIGNATED/ELECTED OFFICE
OF THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY--CHAPTER II

APPLICANT(S):	LUCIAN HIRSCH ET AL
ATTORNEY DOCKET NO.:	P00,1767
INTERNATIONAL APPLICATION NO:	PCT/DE99/01309
INTERNATIONAL FILING DATE:	03 MAY 1999
INVENTION:	METHOD AND COMMUNICATIONS SYSTEM FOR PROCESSING STATE INFORMATION IN A MANAGEMENT NETWORK HAVING A NUMBER OF MANAGEMENT LEVELS

Assistant Commissioner for Patents,
Washington D.C. 20231

AMENDMENT "A" PRIOR TO ACTION

Sir:

Applicants herewith amend the above-referenced PCT application, and request entry of the Amendment prior to examination on the United States Examination Phase.

IN THE SPECIFICATION:

On page 1:

replace lines 1-7, with

--SPECIFICATION

TITLE

METHOD AND COMMUNICATIONS SYSTEM FOR PROCESSING STATE INFORMATION IN A MANAGEMENT NETWORK HAVING A NUMBER OF MANAGEMENT LEVELS

BACKGROUND OF THE INVENTION

Field of the Invention--;

above line 16, insert

--Description of the Related Art--;

in line 19, after "example", insert–,–; and

in line 30, cancel "here".

On page 2:

in line 2, after "as", insert –an–;

in line 10, after the first "is", insert –,–;

in line 13, replace the first "," with –. This is done–;

in line 24, replace "transmission" with –transmitting–;

in line 25, after "i.e.", insert –,–;

above line 31, insert

--SUMMARY OF THE INVENTION--; and

in line 31, replace "specify" with –provide–.

On page 3:

replace lines 1-6 with

-- According to the invention, this object is achieved by a method for processing state information in a communication system by way of a management network having a number of management levels, comprising the steps of: transmitting state information between an agent of one management level and a manager of a next-higher management level for a state realignment; sending, by the manager, a request message for performing the state realignment to the agent; checking, by the agent, the state information with regard to deviations from a normal state; and sending, by the agent, changes in the state information to the manager in one or more successive messages.

The inventive method may use state attributes (OST, AST, UST) and/or status attributes (UNS, ALS, AVS) as state information. A step may be provided for defining the normal state by way of predeterminable values for state attributes OST, AST, UST) and/or status attributes (UNS, ALS, AVS). State attributes (OST, AST, UST) may be used for characterizing an operational readiness, manageability and use of a resource supported by the agent in the communication

system as state information.

The inventive method may also utilize status attributes (UNS, ALS, AVS), which specify for a resource supported by the agent in the communication system whether it is in an unknown state, in an alarmed state or in a state of availability, as state information.

The manager can also send in the request message, a correlation information item for a correlation of the respective request with messages containing changed state information received by the agent, and the agent may send in a message for starting the state realignment, a correlation information item for correlating the messages containing changed state information subsequently sent with the state realignment started in each case.

The inventive method can send correlation information generated by the agent in the message or messages containing the changed state information. The manager may send a parameter to the agent, and control the state realignment in dependence on at least one parameter sent to the agent. The manager may also send a parameter by way of which the state realignment is automatically initiated by the agent, utilizing the parameter. A parameter may be provided by the manager with a parameter value which specifies a starting time and/or an ending time for the automatic state realignment. A parameter value may be provided by the manager that specifies a time interval for a repetition of the automatic state realignment. The manager may also provide a parameter with a parameter value which characterizes resources for which changed state information must be transmitted by the agent. The manager may also provide a parameter permitting interruption of a running state realignment. The parameters may be sent by the manager to the agent in the request message.

The object of the invention is also achieved by a communication system for processing state information in a management network, comprising a number of management levels; an agent of a management level; and at least one a manager of a next-higher management level, state information being transmitted between the agent and the manager for a state realignment; facilities/a controller in the

manager for sending a request message for performing the state realignment to the agent; and facilities/a controller in the agent for checking the state information with regard to deviations from a normal state and for sending changes in the state information to the manager in one or more successive messages. State attributes (OST, AST, UST) and/or status attributes (UNS, ALS, AVS) may be provided as state information. The normal state may be defined by predeterminable values for the state attributes (OST, AST, UST) and/or status attributes (UNS, ALS, AVS). State attributes (OST, AST, UST) may be provided for characterizing an operational readiness, a manageability and a use of a resource supported by the agent in the communication system as state information. Status attributes (UNS, ALS, AVS), which specify for a resource supported by the agent in the communication system whether it is in an unknown state, in an alarm state or in a state of availability, may be provided as state information. The state realignment can be controlled by the facilities in the manager in dependence on at least one parameter sent to the agent. Finally, the manager may send a parameter permitting the state realignment to be automatically initiated by the agent. –

in line 11, cancel "subject matter of the";

in line 21, replace "In consequence" with –Consequentially–;

in line 29, after ",", insert –and–;

in line 30, cancel "subject matter of the"; and

in line 31, replace "In consequence" with –Consequentially–.

On page 4:

in line 2, replace "means" with –way–;

in line 8, after "manageability", insert –,–;

in line 13, after "alarm state", insert –,–; and

in line 30, replace "means" with –way–.

On page 5:

in line 2, after "example", insert –,–; and

in line 30, replace "by simple means" with –in a simple manner–.

On page 6:

in line 13, replace "means" with –way–;

in line 25, after "define", insert –:–;

in line 29, after ",", insert –and–;

above line 31, insert

--BRIEF DESCRIPTION OF THE DRAWINGS --; and

in line 31, replace "will be" with –is–.

On page 7:

in line 1, replace "shows the" with –is a–;

in line 6, replace "shows the" with –is a–;

in line 7, replace "!" with –/--

in line 12, replace "shows the" with –is a–;

in line 16, replace "shows" with –is a sequence diagram showing–;

above line 19, insert

--DESCRIPTION OF THE PREFERRED EMBODIMENTS--;

in line 20, replace "means" with –way–; and

in lines 32-33, replace "The, for example," with –For example, the–.

On page 8, in line 28, after "i.e.", insert –,–;

On page 9:

in line 6, cancel "in" and cancel "case";

in line 9, replace "..." with –through–;

in line 10, replace "..." with –through–;

in line 13, cancel "in";

in lines 16-17, replace "..." with –through–; and

in line 21, cancel "in" and cancel "case".

On page 10:

in line 2, replace "-" with –(–;

in line 3, replace "-" with –)–;

in line 6, replace "0F2" with –OF2–;

in lines 15-16, replace "..." with –through–;

in line 20, after "e.g.", insert –,–;

in line 21, after "e.g.", insert –,–; and

in line 31, after "e.g.", insert –,–.

On page 11:

in line 4, replace "OFi and 0F2" with –OF1 and OF2–;

in line 9, after "e.g.", insert –,–;

in line 10, after "e.g.", insert –,–;

in line 22, replace "OFi and 0F2" with –OF1 and OF2–;

in line 33, after "e.g.", insert –,–; and

in line 34, replace "OFi and 0F2" with –OF1 and OF2–.

On page 12:

in line 15, after "has" insert –facilities/–; and

in line 23, replace "means" with –way–.

On page 13:

in line 2, replace "means" with –way–;

in line 22, after "manageability", insert –,–;

in line 29, after "specify", insert –,–, and cancel ", respectively,"; and

in line 30, after "system", insert –,–.

On page 14:

in line 2, after "manager", insert –,–, cancel the first "or", and before the last "or", insert –,–;

in line 14, replace "means" with –way–;

in line 19, after "above", insert –,–; and

in line 21, after "i.e.", insert –,–.

On page 15:

in line 7, replace "ACTR" with –A-CTR–;

in line 8, replace "CST" with –cst–;

in line 13, replace "whilst" with –while–; and

in line 17, cancel ", respectively," and cancel the last ",".

On page 16:

in line 7, replace "-" with –(–;

in line 9, replace "-" with –)–;

in line 12, replace "OFi, 0F2" with –OF1 and OF2–;

in line 14, replace "means" with –Way–;

in line 15, replace "REPORT" with –Report–;

in line 21, replace "REPORT" with –Report–;

in line 23, cancel ", respectively,"; and

in line 28, replace "means" with –way–.

On page 17:

in line 6, after "example", insert –,–;

in line 9, replace "means" with –mechanism–; and

in line 33, replace "..." with –through–.

On page 18:

in line 5, replace "means" with –way–;

in line 9, replace "means" with –way–;

in line 20, replace "," with –and–;

in line 22, replace "REPORT" with –Report–;

in line 25, replace "REPORT" with –Report–;

in line 27, replace "EVENTREPORT" with – EVENT-Report–;

in line 31, replace "means" with –way–; and

in line 35, replace "MEVENT-REPORT" with –M-EVENT-Report–.

On page 19:

in line 7, after "example", insert –,–;

in line 8, replace "M-EVENTREPORT" with –M-EVENT-Report–;

in line 23, replace "f or" with –for–;

in line 26, replace "means" with –way–;

in line 29, after "example", insert –,–;

in line 32, after "example", insert –,–; and

below line 33, insert

-- The above-described system and method are illustrative of the principles of the present invention. Numerous modifications and adaptions thereof will be readily apparent to those skilled in this art without departing from the spirit and scope of the present invention.--.

IN THE CLAIMS:

On page 20:

replace line 1 with --WHAT IS CLAIMED IS:--;

Please amend claims 1-23 as follows:

1. (Amended) A method [Method] for processing state information in a communication system by way [means] of a management network having [exhibiting] a number of management levels [(A, B, C)], comprising the steps of:

transmitting [the] state information [being transmitted] between an agent [(AG)] of one management level [(B, C)] and a [at least one] manager [(MA1, MA2)] of a next-higher management level [(A, B)] for a state realignment; [, in which method]

sending, by said [- the] manager, [(MA1, MA2) sends] a request message [(staAS)] for performing said [the] state realignment to said [the] agent; [(AG),]

checking, by said [- the] agent, said [(AG) checks the] state information with regard to deviations from a normal state; [,] and

sending, by said [- the] agent, [(AG) sends] changes in said [the] state information to said [the] manager [(MA1, MA2] in one or more successive messages [(staCN)].

2. (Amended) The method as claimed in claim 1, further comprising the step of utilizing state attributes selected from the group consisting of an operational state, an administrative state, and a usage state [in which state attributes (OST, AST, UST) and/or status attributes (UNS, ALS, AVS) are used] as state information.

3. (Amended) The method as claimed in claim 2, further comprising the step of defining said [in which the] normal state [is defined] by [means of] predeterminable values for said state attributes selected from the group consisting of said operational state, said administrative state, and said usage state [the state attributes OST, AST, UST) and/or status attributes (UNS, ALS, AVS)].

4. (Amended) The method as claimed in claim 1, further comprising the step of utilizing [one of the preceding claims, in which] state attributes [(OST, AST, UST)] for characterizing an [the] operational readiness, [the] manageability and [the] use of a resource supported by said [the] agent [(AG)] in said [the] communication system [is used] as state information.

5. (Amended) The method as claimed in claim 1, further comprising the step of utilizing [one of the preceding claims, in which] status attributes [(UNS, ALS, AVS)], which specify for a resource supported by said [the] agent [(AG)] in said [the] communication system whether it is in an unknown state, in an alarmed state or in a state of availability, [is used] as state information.

6. (Amended) The method as claimed in claim 1, further comprising the step of: [one of the preceding claims, in which]

sending, by said [the] manager [(MA1, MA2) also sends] in said [the] request message, [(staAS)] a correlation information item [(staAH)] for a correlation of said [the] respective request with [the] messages [(staCN)] containing [the] changed state information received by said [the] agent [(AG)].

7. (Amended) The method as claimed in claim 1, further comprising the step of: [one of the preceding claims, in which]

sending, by said [the] agent [(AG) also sends] in a message [(staSA)] for starting said [the] state realignment, a correlation information item [(aliNI)] for correlating the messages [(staCN)] containing [the] changed state information subsequently sent with said [the] state realignment started in each case.

8. (Amended) The method as claimed in claim 7, further comprising the step of sending said [in which the] correlation information [(aliNI)] generated by said [the] agent [(AG) is also sent] in said [the] message or messages [(staCN)] containing said [the] changed state information.

9. (Amended) The method as claimed in claim 1, further comprising the steps of: [one of the preceding claims,]

sending, by said manager, a parameter to said agent; and

controlling, by said [in which the] manager [(MA1, MA2) controls the] said state realignment in dependence on said parameter [at least one parameter

(par) sent to the agent (AG)].

10. (Amended) The method as claimed in claim 1, further comprising the steps of: [one of the preceding claims, in which the]

sending, by said manager, [(MA1, MA2) sends] a parameter; [(par) by means of which the]

automatically initiating said state realignment [is automatically initiated] by said [the] agent, utilizing said parameter [(AG)].

11. The method as claimed in claim 10, further comprising the step of providing [in which] a parameter [(par) is provided] by said [the] manager [(MA1, MA2)] with a parameter value [(begT)] which specifies a starting time for said [the] automatic state realignment.

12. (Amended) The method as claimed in claim 10, further comprising the step of providing [or 11, in which] a parameter [(par)] is provided] by said [the] manager [(MA1, MA2)] with a parameter value [(endT)] which specifies an end time for said [the] automatic state realignment.

13. (Amended) The method as claimed in claim 10, further comprising the step of providing, by said [one of claims 10 to 12, in which the] manager, [(MA1, MA2) provides] a parameter [(par)] with a parameter value [(int)] which specifies a time interval for a repetition of said [the] automatic state realignment.

14. (Amended) The method as claimed in claim 9, further comprising the step of providing, by said [one of claims 9 to 13, in which the] manager, [(MA1, MA2) provides] a parameter [(par)] with a parameter value [(relEN)] which characterizes [the] resources for which changed state information must be transmitted by said [the] agent [(AG)].

15. (Amended) The method as claimed in claim 9, further comprising the step of providing, by said [one of claims 9 to 14, in which the] manager, [(MA1, MA2) provides] a parameter [(par)] with a parameter value [(admS) by means of which] that permits interruption of a running state realignment [can be interrupted].

16. (Amended) The method as claimed in claim 9, further comprising the step of sending, by said [one of Claims 9 to 15, in which the] manager, [(MA1, MA2) sends] said [the] parameter [or parameters (par)] to said [the] agent [(AG)] in said [the] request message [(staAS)].

17. (Amended) A communication system for processing state information in a management network, comprising [having]

a number of management levels; [(A, B, C),]

[the state information being transmitted between] an agent [(AG)] of a management level; [(e.g. B)]

[and at least one] a manager [(MA1, MA2)] of a next-higher management level, state information being transmitted between said agent and said manager [(e.g. A)] for a state realignment; [, comprising]

[-] facilities [(M-CTR)] in said [the] manager [(MA1, MA2)] for sending a request message [(staAS)] for performing said [the] state realignment to said [the] agent; [(AG),] and

[-] facilities [(A-CTR)] in said [the] agent [(AG)] for checking said [the] state information with regard to deviations from a normal state and for sending changes in said [the] state information to said [the] manager [(MA1, MA2)] in one or more successive messages [(staCN)].

18. (Amended) The communication system as claimed in claim 17, wherein state attributes are provided selected from the group consisting of an operational state, an administrative state, and a usage state [in which state attributes (OST, AST, UST) and/or status attributes (UNS, ALS, AVS) are provided] as state information.

19. (Amended) The communication system as claimed in claim 18, in which the normal state is defined by values for said state attributes selected from the group consisting of an operational state, an administrative state, a usage state, an unknown state, an alarm status, and an available status [means of predeterminable values for the state attributes (OST, AST, UST) and/or status attributes (UNS, ALS, AVS)].

20. (Amended) The communication system as claimed in claim 17, wherein [one of claims 17 to 19, in which] state attributes [(OST, AST, UST)] are provided for characterizing an [the] operational readiness, a [the] manageability and a [the] use of a resource supported by said [the] agent [(AG)] in said [the] communication system as state information.

21. (Amended) The communication system as claimed in claim 17, wherein [one of claims 17 to 20, in which] status attributes [(UNS, ALS, AVS)], which specify for a resource supported by said [the] agent [(AG)] in said [the] communication system whether it is in an unknown state, in an alarm state or in a state of availability, are provided as state information.

22. (Amended) The communication system as claimed in claim 17, wherein said [one of claims 17 to 21, in which the] state realignment can be controlled by said [the] facilities [(M-CTR)] in said [the] manager [(MA1, MA2)] in dependence on at least one parameter [(par)] sent to said [the] agent [(AG)].

23. (Amended) The communication system as claimed in claim 17, wherein said [one of claims 17 to 22, in which the] facilities [(M-CTR)] in said [the] manager [(MA1, MA2)] send a parameter [(par)] permitting said [by means of which the] state realignment to [can] be automatically initiated by said [the] agent [(AG)].

Please add the following claims 24-29

24. The method as claimed in claim 1, further comprising the step of utilizing state attributes selected from the group consisting of an unknown state, an alarm status, and an available status as state information.

25. The method as claimed in claim 24, further comprising the step of defining said normal state by predeterminable values for said state attributes selected from the group consisting of said unknown state, said alarm status, and said available status.

26. The method as claimed in claim 10, further comprising the step of providing, by said manager, a parameter with a parameter value which characterizes resources for which changed state information must be transmitted by said agent.

27. The method as claimed in claim 10, further comprising the step of providing, by said manager, a parameter with a parameter value that permits interruption of a running state realignment.

28. The method as claimed in claim 10, further comprising the step of sending, by said manager, said parameter to said agent in said request message.

29. The communication system as claimed in claim 17, wherein state attributes are provided selected from the group consisting of an unknown state, an alarm status, and an available status as state information.

IN THE ABSTRACT:

On page 24:

replace lines 1-6 with

–ABSTRACT–;

in line 12, cancel "the subject matter of";

in line 26, after "manager", insert –,–; and

cancel line 29.

REMARKS

The present Amendment revises the specification and claims to conform to United States patent practice, before examination of the present PCT application in the United States National Examination Phase. All of the changes are editorial and applicant believes no new matter is added thereby. The amendment of claims 1-23 and the addition of claims 24-29 is not intended to be a surrender of any of the subject matter of those claims.

Early examination on the merits is respectfully requested.

Submitted by,

(Reg. No. 45,877)

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BOX PCT
IN THE UNITED STATES DESIGNATED/ELECTED OFFICE
OF THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY--CHAPTER II

APPLICANT(S):	LUCIAN HIRSCH ET AL
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INVENTION:	METHOD AND COMMUNICATIONS SYSTEM FOR PROCESSING STATE INFORMATION IN A MANAGEMENT NETWORK HAVING A NUMBER OF MANAGEMENT LEVELS

Assistant Commissioner for Patents,
Washington D.C. 20231

REQUEST FOR APPROVAL OF DRAWING MODIFICATIONS

Sir:

Enclosed are 3 sheets of drawings, Figures 1-4, showing in red, the addition of labels for Figures 1-3 to the elements depicted therein. Approval of the additions is respectfully requested.

Submitted by,

Mark Bergner (Reg. No. 45,877)

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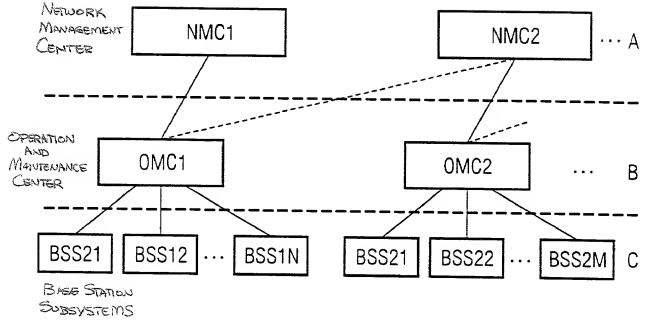
FIG 1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NMC2
... A
OPERATION AND MAINTENANCE CENTER
OMC1
OMC2
... B
BSS21
BSS12
... BSS1N
BSS21
BSS22
... BSS2M
C
BASE STATION SUBSYSTEMS

FIG 2

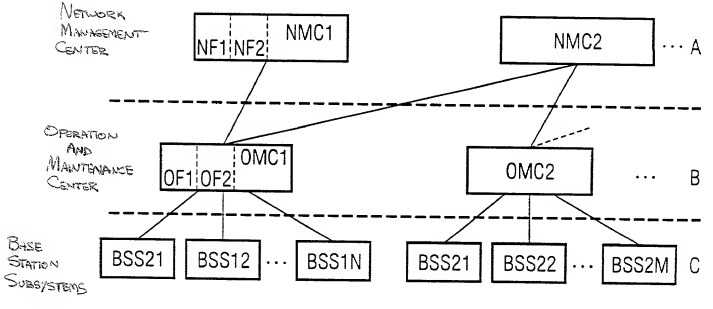

NETWORK MANAGEMENT CENTER
NF1
NF2
NMC1
NMC2
... A
OPERATION AND MAINTENANCE CENTER
OF1
OF2
OMC1
OMC2
... B
BASE STATION SUBSYSTEMS
BSS21
BSS12
... BSS1N
BSS21
BSS22
... BSS2M
C

FIG 3

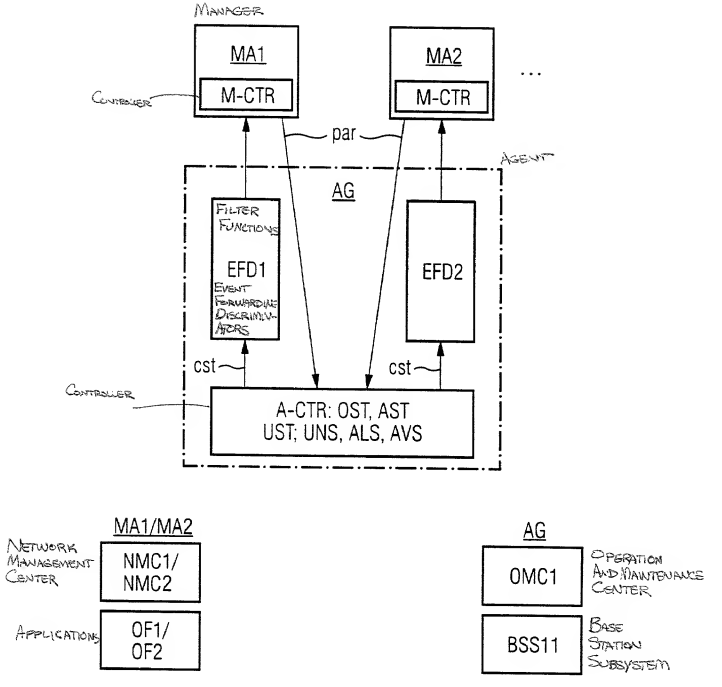
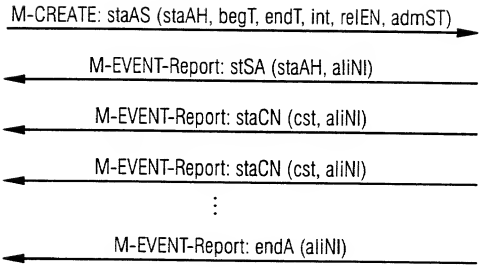

MANAGER
MA1
M-CTR
MA2
M-CTR
...
CONTROLLER
par
AGENT
AG
FILTER FUNCTIONS
EFD1
EVENT FORWARDING DISCRIMINATORS
EFD2
cst
cst
CONTROLLER
A-CTR: OST, AST
UST; UNS, ALS, AVS
MA1/MA2
NETWORK MANAGEMENT CENTER
NMC1/ NMC2
APPLICATIONS
OF1/ OF2
AG
OMC1
OPERATION AND MAINTENANCE CENTER
BSS11
BASE STATION SUBSYSTEM

FIG 4


M-CREATE: staAS (staAH, begT, endT, int, relEN, admST)
M-EVENT-Report: stSA (staAH, aliNI)
M-EVENT-Report: staCN (cst, aliNI)
M-EVENT-Report: staCN (cst, aliNI)
M-EVENT-Report: endA (aliNI)

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529 Rec'd PCT/PTC 10 NOV 2000

Description

Method and communications system for processing state information in a management network having a number of management levels

The invention relates to a method and a corresponding communications system for processing state information in a management network having a number of management levels, the state information being transmitted between an agent of one management level and at least one manager of a next higher management level for a state realignment.

The principles of a management network, which are also called TMN (Telecommunications Management Network) principles, define a number of management levels for the management of a communications system - for example a mobile communications system, each level having a dual function. In the managing system, each level, apart from the lowest one, has a manager function for the level below. In the managed system, each level, apart from the topmost one, has an agent function for the next higher level.

The management of state information (state management) represents one of a number of TMN function areas which characterizes the state of a managed object. A managed object is a logical abstraction of a resource in the communications system. A distinction is made here between hardware-related managed objects which describe a manufacturer-related implementation of a function, and function-related managed objects which are in each case the abstraction of a manufacturer - independent functionality. In an object-oriented environment - such as between manager and agent in a mobile communications

system - each agent functionality is provided by a particular object - as instance of an object class - which is known both to the agent and to the manager. The management state of an object can be described by means of state information according to the ITU-T X.731 standard. In this arrangement, each change of the state of a managed object is transmitted by the agent to the manager in corresponding messages.

If the connection between the two management levels, that is between agent and manager, is no longer guaranteed for a particular period, the agent must temporarily store the changes in the state which have occurred during this interval, in order to ensure that, after the communication capability has been restored, the manager is provided as rapidly as possible with an overview of the current state of the object. For this purpose, a state realignment is performed between agent and manager - for example during the setting up of a new connection after a connection termination or after an initialization of the agent or of the manager. In principle, the manager plays the active role by triggering the state realignment and requesting and receiving the state information for each existing object from the agent. Requesting and transmission is always done for all agent objects, i.e. independently of the content of the respective state information at the time of the request by the manager. In the case of a relatively large number of managed objects, the signaling load is considerable and leads to the alignment procedure taking an undesirably long time.

It is the object of the invention to specify a method and communications system for processing state information in a management network having a number of management levels for improved state realignment.

According to the invention, this object is achieved by the features of patent claim 1 with respect to the method and by the features of patent claim 17 with respect to the communications system. Further developments of the invention can be found in the subclaims.

The invention is based on the fact that state information is transmitted between an agent of one management level and at least one manager of a next higher management level for a state realignment. According to the subject matter of the invention, the manager sends a request message for performance of the state realignment to the agent. The agent checks the state information with respect to deviations from a normal state and sends changes in the state information to the manager in one or a number of successive messages.

As a result of the subject matter of the invention, the state realignment is only performed when changed state information is present so that the manager is informed by the agent on request of deviations from the normal state. In consequence, not all state information is automatically transmitted, irrespective of whether it has changed or not. This results in a reduced information flow between agent and manager which represents a considerable gain for the manager if there is a large number of managed objects. The manager, however, is only interested in the changes in the state information which are necessary for the state realignment, it is consequently only provided with these deviations in accordance with the subject matter of the invention. In consequence, the transmission of state information for which the agent has found no deviation from the normal state can be omitted.

According to a further development of the invention, state attributes and/or status attributes are used as

state information. The normal state is preferably defined by means of predeterminable values for the state attributes and/or status attributes. Due to the above attributes, detailed information on the changed state of each existing object can be called up by the manager and provided by the agent.

State attributes for characterizing the operational readiness, the manageability and the use of a resource supported by the agent in the communications system are preferably used as state information. Furthermore, status attributes which specify, for a resource supported by the agent in the communication system, whether it is in an unknown state, in an alarm state or in a state of availability, are preferably used as state information. Due to the transmission of only the changed attributes, the manager only receives the detailed information required as a minimum in order to produce the state realignment between manager and agent.

It has been found to be advantageous if the manager, in the request message, also sends a correlation information item for correlating the respective request with the messages containing the changed state information received from the agent. As a result, a number of requests for state realignment can run simultaneously or serially. The parallel solution has the advantages of an even better utilization of the transmission resources at the interface of the agent/manager relation and a faster provision of the changed state information for the next higher management level. Due to the correlation by means of the unambiguous correlation information issued by the manager, there is the additional possibility of allocating the incoming responses of the agent, containing the changed state information, to the correct request even if the order is not maintained.

Successively initiated requests can mutually overtake each other, for example when a packet data network is traversed between agent and manager. The agent can process a number of requests in parallel and immediately thereafter send back the state information to the manager or managers for state realignment without regard to the order of the started requests.

A further advantageous development of the invention provides that a correlation information item for a correlation of the subsequently transmitted messages containing the changed state information with the state realignment started in each case is also sent by the agent in a message to start the state realignment. The unambiguous correlation information issued by the agent guarantees that the changed state information items of various state realignments running simultaneously or in series reach the manager which in each case is processing the received state information further, independently of the time when they are sent out by the agent.

According to a particularly advantageous further development of the invention, the manager controls the state realignment in dependence on at least one parameter sent to the agent. The advantage of a state realignment which can be parameterized compared with the base functionality lies in that only certain state information is transmitted on the basis of the parameter transmitted. This provides the manager with a selection function for a subset of all state information. In particular, the possibility of a controlling influence on the realignment by simple means and by using standardized messages increases the flexibility of the manager and additionally reduces the message and information flow. Due to the parameterizable alignment functionality for processing the state information it is possible, for example, to achieve a selection of resources and/or an active control

of the order of the requested information. In particular, the combination of the base functionality - transmission of only the changes of the state on the basis of deviations compared with the normal state - with the parameterizable alignment functionality leads to a particularly effective method and communications system which results in optimum utilization of transmission resources at the interface of the agent/manager relation and the fastest possible provision by the agent of only the state information requested by the manager for the next higher management level.

According to a further development of the invention, the manager sends a parameter by means of which the state realignment is automatically initiated by the agent. Thus, the state realignment can be controlled by the manager in such a manner that it is triggered automatically by the agent at certain times.

According to further advantageous developments of the invention, the parameterization can take place with one or more of the following parameter values, in each case set by the manager. Thus, a parameter is provided by the manager with parameter values which specify a starting time for the automatic state realignment and/or an end time for the automatic state realignment. Other parameter values define

- a time interval for a repetition of the automatic state realignment,
- selected resources for which changed state information is to be transmitted by the agent,
- the termination of a running state realignment.

In the text which follows, the invention will be explained in greater detail with reference to illustrative embodiments and referring to the figures, in which:

Figure 1 shows the block diagram of a management network for a mobile communications system with agent/manager relation between an operations and maintenance center and one or more network management centers,

Figure 2 shows the block diagram of the management network according to Figure 1 with agent! manager relation between a base station system and an operations and maintenance center for performing at least two applications for the base station system,

Figure 3 shows the block diagram of agent and manager for processing the state information for parameterizable state realignments according to the invention, and

Figure 4 shows the message flow between the manager and the agent for controlling the state realignment.

The illustrative embodiment describes the invention by means of a TMN concept for the management of a mobile communication system which, for example, exhibits network facilities of a mobile radio network according to the GSM standard. The invention is not restricted either to the GSM standard or to mobile radio networks but can be applied to telecommunication networks of any type and operation which use a TMN management network.

A mobile communications system is a hierarchically structured system of various network facilities, in which the lowest hierarchy stage is formed by the mobile stations. These mobile stations communicate with the radio stations forming the next hierarchy level, which are called base stations, via a radio interface. The, for example, mobile stations in a radio area of base stations supplying a radio cell are preferably combined for covering a relatively large radio area and connected

to higher-level network facilities, the base station controllers. The base stations and base station controllers belong to a base station subsystem of the mobile communications system. The base station controllers communicate via defined interfaces with one or more switching facilities, the mobile switching centers, via which, among other things, the transition to other communication networks also takes place. The mobile switching centers, together with a plurality of data bases, form the switching subsystem of the mobile communications system.

Apart from the above network facilities, there are one or more operation and maintenance centers which are used for, among other things, configuring and monitoring the network facilities. For this purpose, monitoring measures and configuration measures are in most cases remotely controlled from the operation and maintenance center which are usually arranged in the area of the mobile switching centers. In this arrangement, an operation and maintenance center in each case communicates with a base station subsystem or switching subsystem via a defined interface. A further task of the operation and maintenance center is the management of state information (state management) which represents one of a number of management function areas and characterizes the state of a managed object. A managed object is a logical abstraction of a physical resource - i.e. a network facility - in the mobile communications system. In this context, a distinction is made between hardware-related managed objects which describe a manufacturer-related implementation of a function, and function-related managed objects which are in each case the abstraction of a manufacturer- independent functionality.

For the management of the mobile communications system, the TMN principles define a number of levels, of which, in the present example, three levels will be explained in the text which follows, referring to Figures 1 and 2.

Figures 1 and 2 in each case show three levels A, B and C of the management network, of which management level C contains the network element level comprising a number of base station subsystems BSS11, BSS12. . .BSS1N and BSS21, BSS22. . .BSS2M. Management level B characterizes the network element management level in which the operation and maintenance centers OMC1 and OMC2 in each provide the manufacturer-related management functionality for individual subsystems such as, in the present example, the operation and maintenance center OMC1 for the base station subsystems BSS11, BSS12. . .BSS1N and the operation and maintenance center OMC2 for the base station subsystems BSS21, BSS22. . .BSS2M. Management level A characterizes the network management level in which the network management centers NMC1 and NMC2 in each case implement an integrated manufacturer-independent management functionality. In this arrangement, a number of network management centers can have access to the same network facility of the next-lower management level B, in the present example network management centers NMC1 and NMC2 of the next- higher management level C to the operation and maintenance center OMC1 of the next-lower management level B. Between the network facilities of different management levels, defined interfaces are provided for information transfer.

The difference in the illustrations according to Figure 1 and Figure 2 lies in the fact that there is an agent/manager relation for processing state information for one or more state alignments in Figure 1 between the

operation and maintenance center OMC1 (agent) and a network management center NMC1 (manager) or a number of - physically separate - network management centers NMC1, NMC2 (manager) and, in Figure 2, between the base station subsystem BSS11 (agent) and two different applications OF1 and OF2 (manager) in the operation and maintenance center OMC1 or between the operation and maintenance center OMC1 (agent) and two different applications NF1 and NF2 (manager) in the network management center NMC1. In order to secure an overview of the state of managed objects at any time in the network management centers NMC1, NMC2, the operation and maintenance center OMC1 provides the state information - stored on the basis of events and states which have occurred, for example, within the supported base station subsystems BSS11. . .BSS1N, and sends them on request in parallel to both managers. This is done preferably after a disconnection or after an initialization of the agent or of the manager. Similarly, a number of requests can also be directed successively to the agent, e.g. the operation and maintenance center OMC1, by a single manager, e.g. the network management center NMC1. Figure 1 shows the structure for requests for state realignment sent out a number of times according to the invention, which, in the present example, are running in parallel between management level B in which the agent in the form of the operation and maintenance center OMC1 is located, and the next-higher management level A in which the managers are formed by at least two separate network management centers NMC1, NMC2.

To secure an overview of the state situation at any time also at management level B, e.g. in the operation and maintenance center OMC1, the base station subsystem BSS11 provides the state information - stored on the basis of events and states occurring, for example, within

the supported base stations and base station controllers - and sent in parallel to at least two managers of the operation and maintenance center OMC1 in the form of the different applications OFi and 0F2, both of which are executed by one and the same physical facility OMC1. This is also preferably done after a disconnection or after an initialization of the agent or of the manager. A serial transmission of requests initiated several times by a single manager, e.g. the operation and maintenance center OMC1, to the agent, e.g. the base station subsystem BSS11, is also possible. As an alternative, or additionally, an agent/manager relation can also exist between the operation and maintenance center OMC1 (an agent) and the network management center NMC1 (a manager) for the serial exchange of requests and state information or for the parallel exchange of requests and state information for at least two different applications NF1 and NF2 (two managers) in the network management center NMC1. Figure 2 shows the structure for state realignments running in parallel according to the invention between management level B, in which the managers are located as applications OFi and 0F2, and the next-lower management level C in which the agent is located.

As soon as an internal interface which has failed in management level C is operational again, the state realignment, also called realignment procedure or realignment method, is started on request of the manager/managers, and only the state information which has changed due to deviations compared with a normal state is transmitted by the agent according to the invention. In the present example, the state realignment begins initially between the base station subsystem, e.g. BSS11, and the applications OFi, 0F2 in the operation and maintenance center OMC1 in parallel and then continues in

parallel between the operation and maintenance center OMC1 and the higher-level network management centers NMC1, NMC2. At the end of these procedures, the state situation is updated again both in the OMC and in the NMCs and aligned with one another. Naturally, the realignment method can be limited to the updating of the state information between the agent and managers in two immediately adjoining management levels, e.g. level B and level A.

Figure 3 diagrammatically shows the configuration of agent AG and managers MA1, MA2 with the facilities required for carrying out state realignment procedures running simultaneously - in the case of two or more managers - or serially - with only one manager. Each manager MA1, MA2 and agent AG has a controller M-CTR and, respectively, A-CTR which can generate and evaluate the messages for the state realignment.
Similarly, they have transceivers - not shown in greater detail - for sending and receiving the messages and storage facilities for storing the state information and other user and signaling information.

The controller M-CTR of the manager then generates a request message by means of which the agent is called up to transmit the state information, and preferably inserts into this request message a correlation information item used for correlating the request with messages transmitted subsequently. This correlation information item issued by the controller M-CTR is unambiguous. The request message is transmitted to the agent via the transceivers. For controlling the state realignment, the M-CTR facility of the manager also includes one or more parameters par in the respective request message in order to selectively request certain state information from selected network facilities. The respective request message is sent together with the parameters par to the

agent AG. In particular, the state realignment or realignments can be automated by means of a parameter par so that the controller A-CTR of the agent automatically repeatedly triggers the realignment process within periods defined by a time interval. The parameterizable alignment functionality with regard to the processing of state information makes it possible to achieve, for example, a selection of the resources and/or an active control of the order of the requested information.

The controller A-CTR of the agent AG receives the request message containing the parameters par, evaluates them and checks the state information with respect to any deviations from a normal state. If this is so, the controller A-CTR generates one or more messages in which only the changes of the state information for at least one existing object are successively sent back to the manager MA1, MA2 or, respectively, the controller M-CTR. The state information of managed objects preferably comprises a number of state attributes of which, for example, the attributes OST (operational state), AST (administrative state) and UST (usage state) for identifying the operational readiness, the manageability and the use of a resource supported by the agent and associated with the object in the communication system are specified. The state information preferably also comprises a number of status attributes, of which the attributes UNS (unknown status), ALS (alarm status) and AVS (available status) are defined. In this context, they specify for the respective object or, respectively, for the respective resource in the communication system whether it is in an unknown state (UNS), in an alarm state (ALS) or in a state of availability (AVS).

The state attribute OST can assume the values "enabled" or "disabled", this state information being readable but not changeable from the point of view of the

manager. The state attribute AST can assume the values "unlocked by the manager" or "locked by the manager" or "shutting down", the last-mentioned state value having the significance that no further new services will be accepted by the resource in the case of a currently terminated operation. This state information is readable and changeable from the point of view of the manager. The state attribute UST can assume the values "active, free capacity" or "busy, no free capacity" or "idle", this state information being only readable but not changeable from the point of view of the manager. The normal state, which is used for checking the presence of deviations and thus of changed state information is adjustable by means of a default value which is the result of a combination of the above individual values, for example "enabled", "unlocked by the manager" and "idle". This means that only the changed state information of managed objects, the state of which differs from the normal state defined above is transmitted from agent to manager. All other state information, i.e. of objects in the normal state, remains unconsidered and is not transmitted.

Apart from these state attributes, the status attributes UNS, ALS and AVS define in more detailed form the state of the resource associated with the object with regard to operational readiness, current use and manageability. Thus, the status attribute UNS is set to the value "true" if the state attribute OST or the state attribute AST is not supported. The value of the respective state attribute OST, AST is irrelevant in this context. The status attribute ALS represents an overall indicator for the alarm state of a resource and is only readable by the manager but cannot be influenced by it. The attribute assumes the binary value "one" in the case of an alarm state and a binary value "zero" in the case

of the normal state. The status attribute AVS can assume either no value or a number of values from a defined set of individual values and can also only be read by the manager. The normal state is characterized by an empty set of values.

The state information entered in the storage device of the agent AG is checked by the controller ACTR and only the changed state information CST (changed status) is sent to the controller M-CTR of the manager.

The unambiguous correlation information entered in the request message by the controller M-CTR of the manager MA1, MA2 is then used for correlating the requests whilst any further correlation information item correlates the messages subsequently sent by the agent (state change notifications) with the state realignment started in each case. The correlation information issued by the agent AG or, respectively, its controller A-CTR, is also unambiguous and is sent to the next-higher management level preferably in the respective message together with the changed state information cst. Using the correlation information provides for unambiguous correlation of state realignments performed simultaneously or serially with a number of managers or a single manager.

In the agent AG, a number of filter functions EFD1, EFD2 (event forwarding discriminators), which can in each case be associated with the managers MA1, MA2 and controlled by them, having filter criteria for the messages generated by the agent AG, can also be used so that the messages with the changed state information cst are only routed to the managers MA1, MA2 when the filter criteria are met. The controller M-CTR of the manager is capable of setting up and deleting such filter functions in the agent AG and of establishing the filter criteria in order to be able to control the message flow in

dependence on its individual requirements. The case may therefore occur that the filter function setting is different from manager to manager so that state information with different content is processed by the realignment procedures running simultaneously.

Figure 4 shows the message flow between an agent AG - the operation and maintenance center OMC1 in the example according to Figure 1 shown or the base station subsystem BSS11 in the example of Figure 2 shown - and the manager MA1, MA2 - the different network management centers NMC1, NMC2 in the example according to Figure 1 or the various applications OFi, 0F2 in the example of Figure 2.

The message flow preferably takes place by means of standardized M-EVENT-REPORT Services and an MCREATE Service initiated at the beginning. These are generic CMISE (common management information service element) standardized procedures which are defined according to ITU-T X.710. ITU-T X.731 defines the management of a standardized transmission of state information which is performed in accordance with the M-EVENT-REPORT services. The correlation information is entered in the messages or, respectively, in particular message fields. Furthermore, the managers MA1, MA2 provide the parameters for controlling the state realignment with certain parameter values and enter them individually or in multiples into the respective request message. The example in Figure 4 shows the message flow by means of individual messages which can be transmitted in parallel between the agent AG and the managers MA1, MA2 or serially between the agent AG and the individual manager MA1.

As soon as the communication between a manager MA1, MA2 and the agent AG is restored after an interruption of the connection, each manager MA1, MA2 sends a request

message staAS (start Alignment Scheduler) according to the M-CREATE Service for transmitting the state information to the agent AG for the state realignment. The correlation information staAH (state Alignment Handle) defined by the manager MA1, MA2 is preferably also sent - for example in the defined message field "action information" - which characterizes a direct correlation of the request with the agent messages subsequently received. By this means, the current request can also be allocated to the respective manager in the case of a number of managers so that the parallel realignments of the managers can be initiated, performed and ended independently of one another.

The request message staAS also contains parameter values for the subsequent sequence of functions, entered by the manager. The parameterization can preferably be performed with one or more set parameter values of which the values begT (begin Time), endT (end Time), int (interval), admST (administrative state) and relEN (related entities) are specified by way of example. The specific parameter values describe:

- a starting time (begT), for example date and clock time, for an automatic state realignment and/or an end time (endT), for example date and clock time, for the automatic state realignment,
- a time interval (int), for example in minutes, hours, days etc. for repeating the automatic state realignment,
- selected resources (relEN) for which the changed state information is to be transmitted by the agent,
- the discontinuation (admST) of a running state realignment, a recontinuation of the alignment procedure also being possible with the value admST= unlock. The parameter values begT...admST are contained in a message field, predetermined in accordance with the standard, of

the M-CREATE service so that preexisting and defined fields can also be used.

Following the evaluation of the parameters in the received request message staAS, the agent checks whether there are changes in the state information by means of deviations compared with the normal state and edits the changed state information for each managed object which is not in the normal state. This is preferably done by means of the state and status attributes according to the description relating to Figure 3. The agent AG continues the state realignment by generating a start message stSA (start State Alignment) and inserting the correlation information aliNI (alignment Notification Id) defined by it into this message. The correlation information item staAH issued and transmitted by the manager is also contained in a particular message field of the start message stSA. The correlation information aliNI is entered, for example, in the standardized message field "notification identifier" of the message stSA. Both information items staAH, aliNI are sent out together in the message stSA to the managers MA1, MA2 by the agent AG. As a result, "alignment-related" M-EVENT-REPORT messages of different M-CREATE requests can be distinguished from one another but also from regular M-EVENT-REPORT messages which have nothing to do with the state realignment. This is because an alignment procedure does not necessarily stop other M-EVENTREPORT messages which occur spontaneously during the alignment procedure and are sent to the manager or managers.

After the automatic start of the state realignment - preferably controlled by the manager MA1, MA2 by means of at least one parameter - the agent AG only returns the edited changed state information cst to the requesting manager MA1, MA2 in successive staCN (state Change Notification) messages by using the MEVENT-REPORT

service. In a staCN message, only the state changes found for an object and its associated resource are preferably transmitted so that in the case of a number of objects which may be different, a number of staCN messages are also needed. In this context, each staCN message exhibits the correlation information item aliNI - for example in the defined message field "correlated notifications". After the last M-EVENTREPORT message of each state realignment, the agent AG generates an end message endA (end alignment) which contains the correlation information item aliNI. In a case where all managed objects are in the normal state at the time of the M-CREATE Service or when the messages with the state changes are filtered out by the current filter settings, the end message endA directly follows the start message stSA. The above message flow is repeated for each state alignment until the end of the automatic state realignment is reached which can be seen from the parameter value endT. Even if the example described with respect to Figure 4 relates to parallel realignments with a number of managers, the message flow can naturally also be applied to a number of requests, triggered successively by a single manager, f or processing state information in accordance with the "state alignment". This has the advantage that, due to the unambiguous correlation by means of the correlation information, the individual manager has the capability of being able to allocate the incoming responses of the agent unambiguously to the requests - for example different applications in the manager - even if the order is not maintained. Successively sent requests may overtake each other, for example if a packet network is traversed between agent and manager.

Patent claims

1. Method for processing state information in a communication system by means of a management network exhibiting a number of management levels (A, B, C), the state information being transmitted between an agent (AG) of one management level (B, C) and at least one manager (MA1, MA2) of a next-higher management level (A, B) for a state realignment, in which method

- the manager (MA1, MA2) sends a request message (staAS) for performing the state realignment to the agent (AG),
- the agent (AG) checks the state information with regard to deviations from a normal state, and
- the agent (AG) sends changes in the state information to the manager (MA1, MA2 in one or more successive messages (staCN).

2. The method as claimed in claim 1, in which state attributes (OST, AST, UST) and/or status attributes (UNS, ALS, AVS) are used as state information.

3. The method as claimed in claim 2, in which the normal state is defined by means of predeterminable values for the state attributes OST, AST, UST) and/or status attributes (UNS, ALS, AVS).

4. The method as claimed in one of the preceding claims, in which state attributes (OST, AST, UST) for characterizing the operational readiness, the manageability and the use of a resource supported by the agent (AG) in the communication system is used as state information.

5. The method as claimed in one of the preceding claims, in which status attributes (UNS, ALS, AVS), which specify for a resource supported by the agent (AG) in the communication system whether it is in an unknown state, in an alarmed state or in a state of availability, is used as state information.

6. The method as claimed in one of the preceding claims, in which the manager (MA1, MA2) also sends in the request message (staAS) a correlation information item (staAH) for a correlation of the respective request with the messages (staCN) containing the changed state information received by the agent (AG).

7. The method as claimed in one of the preceding claims, in which the agent (AG) also sends in a message (staSA) for starting the state realignment a correlation information item (aliNI) for correlating the messages (staCN) containing the changed state information subsequently sent with the state realignment started in each case.

8. The method as claimed in claim 7, in which the correlation information (aliNI) generated by the agent (AG) is also sent in the message or messages (staCN) containing the changed state information.

9. The method as claimed in one of the preceding claims, in which the manager (MA1, MA2) controls the state realignment in dependence on at least one parameter (par) sent to the agent (AG).

10. The method as claimed in one of the preceding claims, in which the manager (MA1, MA2) sends a parameter (par) by means of which the state realignment is automatically initiated by the agent (AG).

11. The method as claimed in claim 10, in which a parameter (par) is provided by the manager (MA1, MA2) with a parameter value (begT) which specifies a starting time for the automatic state realignment.

12. The method as claimed in claim 10 or 11, in which a parameter (par) is provided by the manager (MA1, MA2) with a parameter value (endT) which specifies an end time for the automatic state realignment.

13. The method as claimed in one of claims 10 to 12, in which the manager (MA1, MA2) provides a parameter (par)

with a parameter value (int) which specifies a time interval for a repetition of the automatic state realignment.

14. The method as claimed in one of claims 9 to 13, in which the manager (MA1, MA2) provides a parameter (par) with a parameter value (relEN) which characterizes the resources for which changed state information must be transmitted by the agent (AG).

15. The method as claimed in one of claims 9 to 14, in which the manager (MA1, MA2) provides a parameter (par) with a parameter value (admS) by means of which a running state realignment can be interrupted.

16. The method as claimed in one of Claims 9 to 15, in which the manager (MA1, MA2) sends the parameter or parameters (par) to the agent (AG) in the request message (staAS).

17. A communication system for processing state information in a management network having a number of management levels (A, B, C), the state information being transmitted between an agent (AG) of a management level (e.g. B) and at least one manager (MA1, MA2) of a next-higher management level (e.g. A) for a state realignment, comprising

- facilities (M-CTR) in the manager (MA1, MA2) for sending a request message (staAS) for performing the state realignment to the agent (AG), and
- facilities (A-CTR) in the agent (AG) for checking the state information with regard to deviations from a normal state and for sending changes in the state information to the manager (MA1, MA2) in one or more successive messages (staCN).

18. The communication system as claimed in claim 17, in which state attributes (OST, AST, UST) and/or status attributes (UNS, ALS, AVS) are provided as state information.

19. The communication system as claimed in claim 18, in which the normal state is defined by means of predeterminable values for the state attributes (OST, AST, UST) and/or status attributes (UNS, ALS, AVS).

20. The communication system as claimed in one of claims 17 to 19, in which state attributes (OST, AST, UST) are provided for characterizing the operational readiness, the manageability and the use of a resource supported by the agent (AG) in the communication system as state information.

21. The communication system as claimed in one of claims 17 to 20, in which status attributes (UNS, ALS, AVS), which specify for a resource supported by the agent (AG) in the communication system whether it is in an unknown state, in an alarm state or in a state of availability, are provided as state information.

22. The communication system as claimed in one of claims 17 to 21, in which the state realignment can be controlled by the facilities (M-CTR) in the manager (MA1, MA2) in dependence on at least one parameter (par) sent to the agent (AG).

23. The communication system as claimed in one of claims 17 to 22, in which the facilities (M-CTR) in the manager (MA1, MA2) send a parameter (par) by means of which the state realignment can be automatically initiated by the agent (AG).

Abstract of the disclosure

Method and communication system for processing state information in a management network having a number of management levels.

The invention is based on the fact that the state information is transmitted between an agent (AG) of a management level (B,C) and at least one manager (MA1, MA2) of a next-higher management level (A, B). According to the subject matter of the invention, the manager (MA1, MA2) sends a request message (staAS) for performing the state realignment to the agent (AG). The agent (AG) checks the state information with regard to deviations from a normal state and sends changes in the state information to the manager (MA1, MA2) in one or more successive messages (staCN). Due to the subject matter of the invention, the state realignment only takes place when changed state information is present so that the manager is informed of deviations from the normal state. As a consequence, the manager does not automatically receive all state information independently of whether it has changed or not. This results in a reduced information flow between agent and manager which represents a considerable gain for the manager especially in the case of a multiplicity of managed objects.

Figure 2 and 3

FIG 1

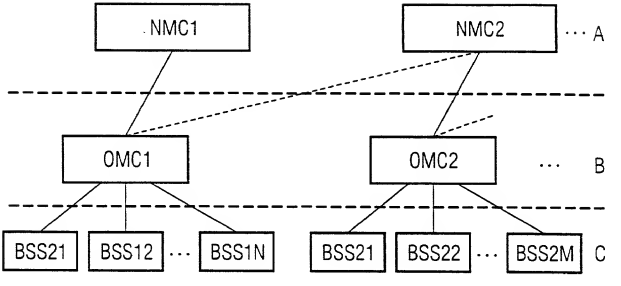

NMC1
NMC2
A
OMC1
OMC2
B
BSS21
BSS12
BSS1N
BSS21
BSS22
BSS2M
C

FIG 2

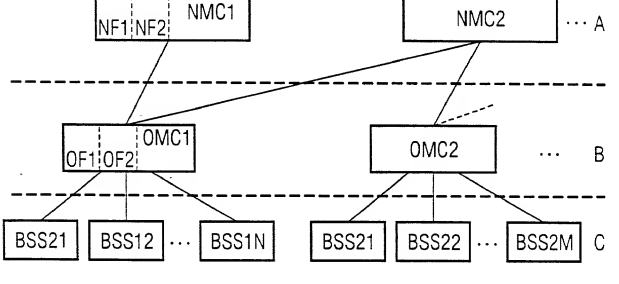

NF1
NF2
NMC1
NMC2
A
OF1
OF2
OMC1
OMC2
B
BSS21
BSS12
BSS1N
BSS21
BSS22
BSS2M
C

FIG 3

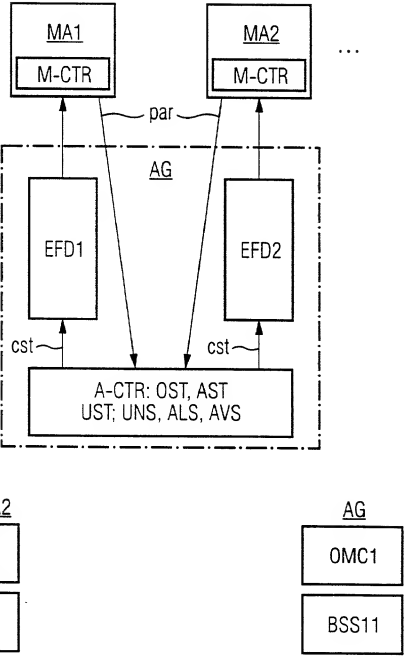
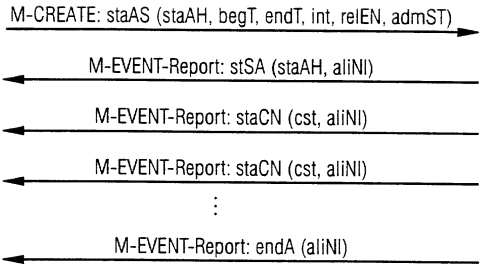

MA1
M-CTR
MA2
M-CTR
...
par
AG
EFD1
EFD2
cst
cst
A-CTR: OST, AST
UST; UNS, ALS, AVS
MA1/MA2
NMC1/
NMC2
OF1/
OF2
AG
OMC1
BSS11

FIG 4


M-CREATE: staAS (staAH, begT, endT, int, relEN, admST)
M-EVENT-Report: stSA (staAH, aliNI)
M-EVENT-Report: staCN (cst, aliNI)
M-EVENT-Report: staCN (cst, aliNI)
M-EVENT-Report: endA (aliNI)

Declaration and Power of Attorney For Patent Application
Erklärung Für Patentanmeldungen Mit Vollmacht
German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

As a below named inventor, I hereby declare that:

dass mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

My residence, post office address and citizenship are as stated below next to my name,

dass ich, nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

Verfahren und Komunikationssystem zur Behandlung von Zustandsinformationen durch ein mehrere Managementebenen aufweisendes Managementnetz

deren Beschreibung

the specification of which

(zutreffendes ankreuzen)

☒ hier beigefügt ist.

☐ am _____ als PCT internationale Anmeldung PCT Anmeldungsnummer _____ eingereicht wurde und am _____ abgeändert wurde (falls tatsächlich abgeändert).

(check one)

☐ is attached hereto.

☐ was filed on _____ as PCT international application PCT Application No. _____ and was amended on _____ (if applicable)

Ich bestätige hiermit, dass ich den Inhalt der obigen Patentanmeldung einschliesslich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) von Wichtigkeit sind, an.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Abschnitt 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119 aller unten angegebenen Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde, und habe auch alle Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde nachstehend gekennzeichnet, die ein Anmeldedatum haben, das vor dem Anmeldedatum der Anmeldung liegt, für die Priorität beansprucht wird.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

German Language Declaration

Prior foreign appplications Priorität beansprucht			Priority Claimed
198 21 032.9 (Number) (Nummer)	Germany (Country) (Land)	11. Mai 1998 (Day Month Year Filed) (Tag Monat Jahr eingereicht)	☒ Yes Ja ☐ No Nein
(Number) (Nummer)	(Country) (Land)	(Day Month Year Filed) (Tag Monat Jahr eingereicht)	☐ Yes Ja ☐ No Nein
(Number) (Nummer)	(Country) (Land)	(Day Month Year Filed) (Tag Monat Jahr eingereicht)	☐ Yes Ja ☐ No Nein

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozeßordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35. United States Code. §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occured between the filing date of the prior application and the national or PCT international filing date of this application.

(Application Serial No.) (Anmeldeseriennummer)	(Filing Date) (Anmeldedatum)	(Status) (patentiert, anhängig, aufgegeben)	(Status) (patented, pending, abandoned)
(Application Serial No.) (Anmeldeseriennummer)	(Filing Date) (Anmeldedatum)	(Status) (patentiert, anhängig, aufgeben)	(Status) (patented, pending, abandoned)

Ich erkläre hiermit, dass alle von mir in der vorliegenden Erklärung gemachten Angaben nach meinem besten Wissen und Gewissen der vollen Wahrheit entsprechen, und dass ich diese eidesstattliche Erklärung in Kenntnis dessen abgebe, dass wissentlich und vorsätzlich falsche Angaben gemäss Paragraph 1001, Absatz 18 der Zivilprozessordnung der Vereinigten Staaten von Amerika mit Geldstrafe belegt und/oder Gefängnis bestraft werden koennen, und dass derartig wissentlich und vorsätzlich falsche Angaben die Gültigkeit der vorliegenden Patentanmeldung oder eines darauf erteilten Patentes gefährden können.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

German Language Declaration

VERTRETUNGSVOLLMACHT: Als benannter Erfinder beauftrage ich hiermit den nachstehend benannten Patentanwalt (oder die nachstehend benannten Patentanwälte) und/oder Patent-Agenten mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Geschäfte vor dem Patent- und Warenzeichenamt: *(Name und Registrationsnummer anführen)*

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

19

And I hereby appoint

Messrs. John D. Simpson (Registration No. 19,842) Lewis T. Steadman (17,074), William C. Stueber (16,453), P. Phillips Connor (19,259), Dennis A. Gross (24,410), Marvin Moody (16,549), Steven H. Noll (28,982), Brett A. Valiquet (27,841), Thomas I. Ross (29,275), Kevin W. Guynn (29,927), Edward A. Lehmann (22,312), James D. Hobart (24,149), Robert M. Barrett (30,142), James Van Santen (16,584), J. Arthur Gross (13,615), Richard J. Schwarz (13,472) and Melvin A. Robinson (31,870), David R. Metzger (32,919), John R. Garrett (27,888) all members of the firm of Hill, Steadman & Simpson, A Professional Corporation.

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Direct Telephone Calls to: *(name and telephone number)*

312/876-0200
Ext. _____

Postanschrift:

Send Correspondence to:

HILL, STEADMAN & SIMPSON
A Professional Corporation
85th Floor Sears Tower, Chicago, Illinois 60606

Voller Name des einzigen oder ursprünglichen Erfinders:	Full name of sole or first inventor:
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Unterschrift des Erfinders Datum 15/4/99	Inventor's signature Date
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D-81373 München Bundesrepublik Deutschland	
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Unterschrift des Erfinders Datum X 14/4/99	Second Inventor's signature Date
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Bundesrepublik Deutschland	
Postanschrift	Post Office Address
Hofoldingerstr. 3	
D-81671 München Bundesrepublik Deutschland	

(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben).

(Supply similar information and signature for third and subsequent joint inventors).

BOX PCT
IN THE UNITED STATES DESIGNATED/ELECTED OFFICE
OF THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY--CHAPTER II

APPLICANT(S):	LUCIAN HIRSCH ET AL
ATTORNEY DOCKET NO.:	P00,1767
INTERNATIONAL APPLICATION NO:	PCT/DE99/01309
INTERNATIONAL FILING DATE:	03 MAY 1999
INVENTION:	METHOD AND COMMUNICATIONS SYSTEM FOR PROCESSING STATE INFORMATION IN A MANAGEMENT NETWORK HAVING A NUMBER OF MANAGEMENT LEVELS

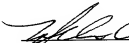
Assistant Commissioner for Patents,
Washington D.C. 20231

APPOINTMENT OF ASSOCIATE POWER OF ATTORNEY

Dear Sir:

I am an attorney designated on the Power of Attorney for the above-referenced application. I hereby appoint Mark Bergner (Reg. No. 45,877) as an associate attorney, with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

Submitted by,



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